CLAIMS

1 A module board device comprising:

a first organic substrate in which a conductive pattern or patterns is or are formed on the principal surface thereof, and one element body or more are mounted; and

a second organic substrate in which a recessed portion is formed in correspondence with the area where the element body or bodies is or are formed at a connecting surface to the first organic substrate,

whereby, in the state where the second organic substrate is connected to the first organic substrate, an element body accommodating space portion which seals the element body or bodies is constituted by the recessed portion, and the element body accommodating space portion is constituted in such a manner that moisture resistance characteristic and oxidation resistance characteristic are maintained.

2 The module board device as set forth in claim 1,

wherein the first organic substrate and the second organic substrate are formed by organic material having moisture resistance characteristic, or mixed material including such organic material.

3 The module board device as set forth in claim 1,

wherein a shield layer having moisture resistance characteristic and oxidation resistance characteristic is formed at the element mounting area of

the first organic substrate and the recessed portion of the second organic substrate which constitute the element body accommodating space portion.

4 The module board device as set forth in claim 3,

wherein the shield layer consists of silicon oxide layer, silicon nitride layer, silicon carbide layer, boron nitride layer, or Diamond Like Carbon layer of at least one layer or more which can be formed as film under the low temperature condition.

5 The module board device as set forth in claim 3,

wherein the shield layer consists of at least one metallic layer or more, and serves to render electromagnetic wave resistance characteristic along with the moisture resistance characteristic and the oxidation resistance characteristic to the element body accommodating space portion.

6 The module board device as set forth in claim 1,

wherein an air vent hole communicating with the element body accommodating space portion is formed at the first organic substrate or the second organic substrate, and the air vent hole is sealed after air is deflated from the element body accommodating space portion to fill inactive gas.

7 The module board device as set forth in claim 1,

wherein the element body is Mechanical Electrical Micro System element, Surface Acoustic Wave filter element, high frequency element, or integrated circuit element having movable portion.

8 The module board device as set forth in claim 1,

wherein at least either one of the first organic substrate and the second organic substrate is adapted so that at least one build-up wiring layer or more is or are formed on the second principal surface opposite to the connecting surface.

9 The module board device as set forth in claim 8,

wherein the second principal surface is constituted as a build-up formation surface to which polishing processing has been implemented so that it is planarized (flattened).

10 The module board device as set forth in claim 8,

wherein the build-up wiring layer is constituted as a high frequency circuit portion in which at least one kind of passive element or elements is or are formed as film by the thin film technology or the thick film technology.

11 A method of manufacturing a module board device, including:

a step of mounting one element body or more onto the principal surface of a first organic substrate where a conductive pattern or patterns has or have been formed; and

a step of connecting a second organic substrate, in which a recessed portion is formed in correspondence with the area where the element body or bodies is or are mounted at a connecting surface to the first organic substrate, to the first organic substrate in such a manner to seal the element body or

bodies into an element body accommodating space portion constituted by the recessed portion,

wherein the element body accommodating space portion is constituted as a space portion in which moisture resistance characteristic and oxidation resistance characteristic are maintained.

12 The method of manufacturing module board device as set forth in claim 11,

wherein the connecting step of the first organic substrate and the second organic substrates is performed within inactive gas atmosphere.

13 The method of manufacturing module board device as set forth in claim 11,

wherein an air vent hole communicating with the element body accommodating space portion is formed at the first organic substrate or the second organic substrate, and

,subsequently to the connecting step of the first organic substrate and the second organic substrate, a step of deflating air within the element body accommodating space portion through the air vent hole, a step of filling inactive gas into the element body accommodating portion through the air vent hole, and a step of closing the air vent hole are implemented.

14 The method of manufacturing module board device as set forth in claim 11,

wherein the connecting step of the first organic substrate and the second organic substrate consists of a step of sticking adhesive sheet to either one connecting surface of the first organic substrate and the second organic substrate, a step of combining the first organic substrate and the second organic substrate after undergone positioning, and a step of allowing the first organic substrate and the second organic substrate to be in pressure contact with each other.

15 The method of manufacturing module board device as set forth in claim 11,

wherein the connecting step of the first organic substrate and the second organic substrate consists of a step of combining the first organic substrate and the second organic substrate after undergone positioning, and a step of applying ultrasonic wave to the connecting surface of the first organic substrate and the second organic substrate to weld it.

16 The method of manufacturing module board device as set forth in claim 11, including:

a step of forming a shield layer by shield material consisting of silicon oxide, silicon nitride, silicon carbide, boron nitride or Diamond Like Carbon of at least one layer or more which can be formed as film under low temperature condition at an element body mounting area and a recessed portion which constitute at least the element accommodating space portion of

the first organic substrate and the second organic substrate,

wherein the element accommodating space portion is constituted by the shield layer as a space portion in which moisture resistance characteristic and oxidation resistance characteristic are maintained.

17 The method of manufacturing module board device as set forth in claim 11, including

a step of forming a shield layer consisting of metallic film of at least one layer or more at an element body mounting area and a recessed portion which constitute at least the element accommodating space portion of the first organic substrate and the second organic substrate,

wherein the element accommodating space portion is constituted by the shield layer as a space portion in which electromagnetic wave resistance characteristic is maintained along with moisture resistance characteristic, oxidation resistance characteristic.

18 The method of manufacturing module board device as set forth in claim 11, including:

a step of forming an insulating resin layer onto the entire surface of a second principal surface opposite to a connecting surface of either one of the first organic substrate and the second organic substrate; a step of implementing polishing processing to the insulating resin layer to allow the second principal surface to be a planarized (flattened) build-up formation

surface, and a step of forming one build-up wiring layer or more including at least one kind of passive element or more formed by the thin film technology or the thick film technology on the build-up formation surface.

19 A high frequency module composed of:

a base substrate portion comprising a first organic substrate in which a conductive pattern or patterns is or are formed on the principal surface thereof and an element body or bodies is or are mounted, and a second organic substrate in which a recessed portion is formed in correspondence with the area where the element body or bodies is or are mounted at a connecting surface to the first organic substrate, whereby, in the state where the first organic substrate and the second organic substrate are connected, an element body accommodating space portion which seals the element body or bodies is constituted by the recessed portion, the element body accommodating space portion is constituted as a space portion in which moisture resistance characteristic and oxidation resistance characteristic are maintained, and a second principal surface opposite to a connecting surface of either one of the first organic substrate and the second organic substrate constitutes a build-up formation surface; and

a high frequency circuit portion composed of one build-up wiring layer or more in which a conductive pattern or patterns is or are formed on a dielectric insulating layer at the build-up formation surface of the base

substrate portion, and including at least one kind of passive element or more formed by the thin film technology or the thick film technology, the build-up wiring layer being via-connected to the base substrate portion and/or the element body or bodies, and high frequency circuit components (parts) mounted on the build-up wiring layer of the uppermost layer,

wherein the high frequency circuit portion is laminated and formed on the build-up formation surface of the base substrate portion to which planarization (flattening) processing has been implemented.

20 The high frequency module as set forth in claim 19,

wherein the element body mounted on the base substrate portion is one Mechanical Electrical Micro System switch or more, and is operative so that switching operation is performed to thereby switch capacity characteristic of capacity pattern formed at the build-up wiring layer of the high frequency circuit portion.

21 The high frequency module as set forth in claim 19,

wherein the element body accommodating space portion formed at the base substrate portion is constituted as a space portion in which electromagnetic wave resistance characteristic has been maintained along with moisture resistance characteristic and oxidation resistance characteristic as the result of the fact that a shield layer consisting of at least one metallic layer or more is formed at the element mounting area of the first organic substrate and

the recessed portion of the second organic substrate.

22 A method of manufacturing a high frequency module, including;

a step of manufacturing a base substrate portion adapted so that an element body accommodating space portion is constituted as a space portion in which moisture resistance characteristic and oxidation resistance characteristic are maintained via a step of mounting an element body or bodies on the principal surface of a first organic substrate in which a conductive pattern or patterns is or are formed, a step of connecting a second organic substrate, in which a recessed portion is formed in correspondence with the area where the element body or bodies is or are mounted at a connecting surface to the first organic substrate, to the first organic substrate in such a manner to seal the element body or bodies within the element body accommodating space portion constituted by the recessed portion, and a step of implementing planarization (flattening) processing to a second principal surface opposite to the connecting surface of at least either one of the first organic substrate and the second organic substrate to form a build-up formation surface; and

a step of forming a high frequency circuit portion via s step of forming one build-up wiring layer or more in which a conductive pattern or patterns is or are formed on a dielectric insulating layer at the build-up formation surface of the base substrate portion, and at least one kind of passive element or

elements is or are formed by the thin film technology or the thick film technology, the build-up wiring layer being via-connected to the conductive pattern or patterns and/or the element body or bodies of the first organic substrate, and a step of mounting high frequency circuit components (parts) on the build-up wiring layer of the uppermost layer.

23 The method of manufacturing high frequency module as set forth in claim 22,

wherein, at the step of manufacturing the base substrate portion, the connecting step of the first organic substrate and the second organic substrate is performed within inactive gas atmosphere.

24 The method of manufacturing high frequency module as set forth in claim 22,

wherein there is used the first organic substrate or the second organic substrate in which an air vent hole communicating with the element body accommodating space portion is formed, and

wherein, at the step of manufacturing the base substrate portion, as a step subsequent to a connecting step of the first organic substrate and the second organic substrate, a step of deflating air within the element body accommodating space portion through the air vent hole, a step of filling inactive gas into the element body accommodating space portion through the air vent hole, and a step of closing the air vent hole are implemented to

hermetically introduce or fill inactive gas within the element body accommodating space portion.

25 The method of manufacturing high frequency module as set forth in claim 22,

wherein the connecting step of the first organic substrate and the second organic substrate consists of a step of sticking adhesive sheet to either one connecting surface of the first organic substrate and the second organic substrate, a step of combining the first organic substrate and the second organic substrate after undergone positioning, and a step of allowing the first organic substrate and the second organic substrate to be in pressure contact with each other.

26 The method of manufacturing high frequency module as set forth in claim 22,

wherein the connecting step the first organic substrate and the second organic substrate consists of a step of combining the first organic base and the second organic substrate after undergone positioning, and a step of applying ultrasonic wave to a connecting surface of the first organic substrate and the second organic substrate to weld it.

27 The method of manufacturing high frequency module as set forth in claim 22,

wherein the step of forming the build-up wiring layer is adapted so

that a first wiring layer is formed via a step of forming photosensitive dielectric layer onto the entire surface of the build-up formation surface of the base substrate portion, a via formation step and a step of forming a conductive pattern or patterns onto the photosensitive dielectric layer, and wiring layers of upper layers are formed in succession via similar steps on the first wiring layer, and

a step of implementing a step of forming solder resist layer and an electrode formation step to the wiring layer of the uppermost layer to mount high frequency circuit components (parts).